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Proponent revision 7/29

TAG REVISION 7/30/21

STATE OF WASHINGTON

**STATE BUILDING CODE COUNCIL**Washington State Energy Code Development  
**Standard Energy Code Proposal Form**Code being amended: ☒ Commercial Provisions ☐ Residential Provisions

Code Section # \_\_Table C402.4\_\_

Brief Description: Efficient Fenestration

- Reduce average U-values for fenestration.
- Allow slightly higher U-value for operable windows (U-0.28 instead of U-0.26), in order to provide a greater range of window choices.
- Adjust the fenestration U-value requirements for increased allowable fenestration area.

Proposed code change text:

**Table C402.4****Building Envelope Fenestration Maximum U-factor and SHGC Requirements**

CLIMATE ZONE	5 AND MARINE 4	
<b><i>U-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products<sup>a</sup></i></b>		
Fixed <sup>b</sup> <i>U</i> -factor	<del>((U-0.38))</del> <u>U-0.34</u>	
Operable <sup>c</sup> <i>U</i> -factor	<del>((U-0.40))</del> <u>U-0.36</u>	
<b><i>Entrance doors<sup>d</sup></i></b>		
<i>U</i> -factor	U-0.60	
<b><i>U-factor for all other vertical fenestration</i></b>		
<u>Fixed</u> <i>U</i> -factor	<del>((U-0.30))</del> <u>U-0.26</u>	
<u>Operable<sup>c</sup> <i>or mulled windows with fixed and operable sections</i> <i>U</i>-factor</u>	<u>U-0.28</u>	
<u><b>Combination fixed/operable units</b></u>	<u><b>U-0.27</b></u>	
<b>SHGC for all vertical fenestration</b>		
Orientation <sup>e,f</sup>	SEW	N

CLIMATE ZONE	5 AND MARINE 4	
PF < 0.2	0.38	0.51
0.2 ≤ PF < 0.5	0.46	0.56
PF ≥ 0.5	0.61	0.61
Skylights		
U-factor	((U-0.50)) U-0.45	
SHGC	((U-0.35)) U-0.32	

#### C402.4.1.1.2 High-performance fenestration.

All of the following requirements shall be met:

1. All *vertical fenestration* in the building shall comply with the following *U*-factors:

a. *U*-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products (fixed) = ((0.34)) 0.30 0.31

b. *U*-factor for Class AW windows rated in accordance with AAMA/CSA101/I.S.2/A440, vertical curtain walls and site-built fenestration products (operable) = 0.36

c. Entrance doors = 0.60

d. *U*-factor for all other vertical fenestration, fixed = ((0.28)) 0.22 0.23

e. *U*-factor for all other vertical fenestration, operable or mulled windows with fixed and operable sections = 0.24

f. *U*-factor for factory-assembled combination units with both fixed and operable sections = 0.23

2. The SHGC of the vertical fenestration shall be no more than 0.90 times the maximum SHGC values listed in Table C402.4 ((less than or equal to 0.35, adjusted for projection factor in compliance with C402.4.3)).

An area-weighted average shall be permitted to satisfy the *U*-factor requirement for each fenestration product category listed in Item 1 of this section. Individual fenestration products from different fenestration product categories shall not be combined in calculating the area-weighted average *U*-factor, **except that fenestration from lines a and b are permitted to be combined and fenestration from lines d and e are permitted to be combined.**

Purpose of code change:

- Fenestration is typically responsible for approximately 2/3 of envelope heat loss.
- Our new building envelopes will remain unchanged for several decades, so we need to build them close to our 2050 standards today.

Your amendment must meet one of the following criteria. Select at least one:

- |  |   |
|--|---|
| <input type="checkbox"/> Addresses a critical life/safety need.  | <input type="checkbox"/> Consistency with state or federal regulations. |
| <input type="checkbox"/> The amendment clarifies the intent or application of the code.  | <input type="checkbox"/> Addresses a unique character of the state.     |
| <input checked="" type="checkbox"/> Addresses a specific state policy or statute.<br>(Note that energy conservation is a state policy) | <input type="checkbox"/> Corrects errors and omissions.                 |

Check the building types that would be impacted by your code change:

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Single family/duplex/townhome | <input type="checkbox"/> Multi-family 1 – 3 stories | <input checked="" type="checkbox"/> Multi-family 4 + stories |
|--|---|--|

☒ Commercial / Retail

☒ Institutional

☒ Industrial

Your name Duane Jonlin

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Your organization City of Seattle

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Other contact name -

## **Economic Impact Data Sheet**

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants and businesses.

This proposal reduces heat loss through fenestration, the most significant heat loss for building envelopes, which typically remain unaltered for generations after construction. The higher-performance fenestration is moderately more expensive than conventional, a cost that is likely to moderate as the new standard becomes business-as-usual across the state. Heating utility bills will be lower for the life of the building.

Provide your best estimate of the construction cost (or cost savings) of your code change proposal? (See OFM Life Cycle Cost [Analysis tool](#) and [Instructions](#); use these [Inputs](#). **Webinars on the tool can be found [Here](#) and [Here](#)**)

\$0.09/square foot (For residential projects, also provide \$69/ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

Higher performing fenestration adds \$1/sf

69 sf of window for an apartment would add \$69 per apartment

Provide your best estimate of the annual energy savings (or additional energy use) for your code change proposal?

0.016KBTU/ square foot

(For residential projects, also provide 12.4KWH/KBTU / dwelling unit)

Show calculations here, and list sources for energy savings estimates, or attach backup data pages

U-factor for fixed standard window = 0.26 vs. 0.30

Cost per sf of floor area = \$69/750 sf= \$0.09/sf

Seattle HDD = 4424

UA w/ 0.26 = 0.26 x 69 = 17.9 x 4424 HDD = 79,190 = 79.2 kBTU/3.4 = 23.3 KWH x \$0.11 x 24hr = \$61.50

UA w/ 0.30= 0.30 x 69 = 20.7 x 4424 = 91,576 = 91.6 KBTU/3.4 = 26.9 KWH x \$0.11 x 24hr = \$71.12

\$71.12 - \$61.50 = \$9.62 per year savings @750 sf per apartment = \$0.013/sf

91.6 kbtu – 79.2 kbtu = 12.4 kbtu per year @750 sf per apartment = 0.016 kbtu/sf

List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

No extra code enforcement time will be required.